



## Course Syllabus (Academic Year 2021)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

1. **Course No. and Title** : KAGS 355 Geochemistry  
**Credit (study hours)** : 2 (2-0-4)
2. **Program Name** : Bachelor of Science in Geoscience
3. **Course Module** : 1<sup>st</sup> semester of 3<sup>rd</sup> year  
**Pre/co-requisite** : SCCH 136
4. **Class Semester** :  1<sup>st</sup> Semester       2<sup>nd</sup> Semester      Academic Year 2020
5. **Class Schedule & Venue** : Thursday at 09.00-11.00, Room 2212
6. **Class Coordinator** : Dr. Patchawee Nualkhao  
 Contact No. 0956324244 Email: patchawee.nua@mahidol.edu

### 7. Course Description

Origin and distribution of the chemical elements, geochemical cycles operating in the earth's atmosphere, hydrosphere and lithosphere, chemical weathering of earth material and soil geochemistry, mobilization of elements and geochemical processes, the origin of solid fuel (coal and oil shales) and petroleum, advance chemical analysis in Geochemistry

### 8. Course Objectives / Course Learning Outcomes (CLOs)

No.	Objectives / CLOs	Expected Skills / Knowledge			PLOs
		Specific	Generic	Knowledge	
8.1	Students can explain the origin of the earth and the distribution of the chemical elements and the geochemical cycles operating in the earth's atmosphere, hydrosphere and lithosphere.	Basic knowledge	Analytical thinking	Fundamental knowledge	2, 3, 4
8.2	Students can understand in chemical weathering of earth material and soil geochemistry and can explain the origin of solid fuel (coal and oil shales) and	Basic knowledge	Analytical thinking	Chemical weathering and source of energy	2, 4, 5

	petroleum.				
8.3	Students can explain the properties of the elements that make up the whole earth and the associated chemical processes.	Basic knowledge	Analytical thinking	Fundamental knowledge	2, 3, 4
8.4	Students can explain the distribution of the elements on the earth and can select an appropriate advanced instrument for chemical analysis.	Basic knowledge	Analytical thinking	Instrumental analysis	2, 3, 4, 5
8.5	Students are able to work effectively with the team members.	Basic knowledge	Reasonable	Application of fundamental knowledge	1, 4, 5

## 9. Class Instructor List

9.1 Name : Dr. Patchawee Nualkhao Contact No. : 095-6324244 Email : patchawee.nua@mahidol.edu

9.2 Name : Dr. Waraporn Threeprom Contact No. : 083-7784445 Email : wthreeprom@yahoo.com

9.3 Name : Dr. Apivut Veeravinitanakul Contact No. : 083-5393519 Email : apivut.vee@mahidol.edu

## 10. Course Outline (based on reference sheet)

Week	Date	Contents	CLOs	Instructor's Names
1	10 Aug 2023	Introduction to Geochemistry and Ionic Equilibria and Carbonate Equilibrium	1, 2	Asst. Prof. Dr. Waraporn Threeprom
2	17 Aug 2023	Chemical Weathering and Structural Chemistry and Clay Mineral	1, 2	Asst. Prof. Dr. Waraporn Threeprom
3	24 Aug 2023	Eh – pH diagram and Organic materials in sediments	2, 3	Asst. Prof. Dr. Waraporn Threeprom
4	31 Aug 2022	Organic materials in sediments	2, 3	Asst. Prof. Dr. Waraporn Threeprom
5	7 Sep 2023	The properties of elements	2, 3	<u>Dr. Patchawee Nualkhao</u>
6	14 Sep 2023	Trace elements in igneous processes	2, 3	<u>Dr. Patchawee Nualkhao</u>
7	21 Sep 2023	Fractionation of stable isotope and	2, 3	<u>Dr. Patchawee Nualkhao</u>

		Mineral reactions		
8	28 Sep 2023	The chemistry of natural waters	3, 4	Dr. Patchawee Nualkhao
9	Mid-term Examination			
10	12 Oct 2023	Geochemical Instrumentation and Analysis	3, 4	Dr. Patchawee Nualkhao
11	19 Oct 2023	Introduction to Geochronology and Thermochronology	3, 4	Dr. Apivut Veeravinantanakul
12	26 Oct 2023	Sampling, sample treatment, analytical methods in geochemistry, analytical data treatment and geostatistics	3, 4	Dr. Apivut Veeravinantanakul
13	2 Nov 2023	Geochemical data interpretation: Chemical formula calculation of minerals, Major elements data and CIPW Norm calculation	3, 4	Dr. Apivut Veeravinantanakul
14	9 Nov 2023	Geochemical data interpretation: Trace elements data and Tectonic discrimination diagrams	3, 4	Dr. Apivut Veeravinantanakul
15	16 Nov 2023	Geochemical data interpretation: Radiogenic isotope data and Stable isotope data	3, 4	Dr. Apivut Veeravinantanakul
16	23 Nov 2023	Applied geochemistry: Mineral resources and Environmental geochemistry	3, 4	Dr. Apivut Veeravinantanakul
17	Final Examination			

#### 11. Course Assessment (based on reference sheet)

No.	Methods / Activities	Regulations	CLOs	Week	Weight Distribution (%)
11.1	Mid-term exam	Exam	1-2	9	30
11.2	Final exam	Exam	3-5	17	30
11.3	Quiz	Questions during classes	1-5	1-8, 10-16	10
11.4	Reports / Assignments	Presentations	1-5	1-8, 10-16	20

11.5	Class participation	Must be greater than 80%	1-5	1-8, 10-16	10
				<b>Total</b>	<b>100</b>

## 12. Grading System (based on reference sheet)

Criterion-referenced evaluation

Grade	Score	Grade	Score	Grade	Score	Grade	Score
A	≥ 80 %	B	70 – 74.99%	C	60 – 64.99%	D	50 – 54.99%
B+	75 – 79.99%	C+	65 – 69.99%	D+	55 – 59.99%	F	< 50 %

Norm-referenced evaluation

\*If use both criterion and norm-referenced evaluation, please tick two boxes.

## 13. References

13.1 Albarède, Francis. (2003). *Geochemistry: An Introduction*. 10.1017/CBO9781139165006.

13.2 W.M. White, 2013, *Geochemistry*, Wiley-Blackwell. 668p.

13.3 K.B. Krauskopf and D.K. Bird, 1989, *Introduction to Geochemistry*, 3rd Ed., McGRAW-HILL International Editions, Earth & Planetary Sciences Series.

13.4 W.S. Fyfe, 1974, *Geochemistry*, Oxford Chemistry Series, General Editors; P.W. Atkins, J.S.E. Holder and A.K. Holliday, Oxford University Press.